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Anterograde Percutaneous Coronary–Cameral Fistula Closure Employing a Guide-in-Guide Technique

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A 33-year-old woman was evaluated for palpitations and a continuous murmur. Echocardiography demonstrated a dilated vascular structure posterior to the aortic root. Coronary angiography revealed a coronary–cameral fistula originating from the left main coronary artery emptying into the right atrium (RA) via a kidney-shaped vascular cistern (Fig. 1, Online Video 1). The left dominant coronary gave rise to the left anterior descending (LAD) and circumflex (LCX) arteries within 10 mm of the left coronary ostium. The pulmonary artery pressure was 60/30 mm Hg, and the Qp/Qs ratio was 1.5.

Because of atrial arrhythmias and the pulmonary hypertension associated with the left-to-right shunt, fistula closure was advised.

Procedural planning employing computed tomographic angiography (CTA) (Fig. 2, Online Video 2), suggested multiple fistula exit sites into the RA; anatomy was confirmed by transesophageal echocardiography. Therefore, retrograde closure was not pursued.

An anterograde approach from the right femoral artery using a telescoping dual guide catheter system was employed. An 8-F extra-backup (XB) 3.5 guide catheter (Cordis, Miami, Florida) was cut to a length that would just reach the left coronary origin. A 7-F Terumo sheath (Terumo Medical, Somerset, New Jersey) applied to the adulterated end afforded hemostasis. A 0.035-inch Terumo Glidewire was advanced into the coronary fistula, coiling the distal wire within the cistern (Fig. 3). Over this guidewire, a 100-cm length, 6-F Judkins right 4.0 (JR4) guide catheter was advanced within the 8-F guide, with the distal tip reaching the entrance of the vascular cistern. Based on the CTA centerline analysis of the diameter (Fig. 4), a 12-mm Amplatzer Vascular Plug II (St. Jude Medical, Plymouth, Minnesota) was deployed via the 6-F guide.

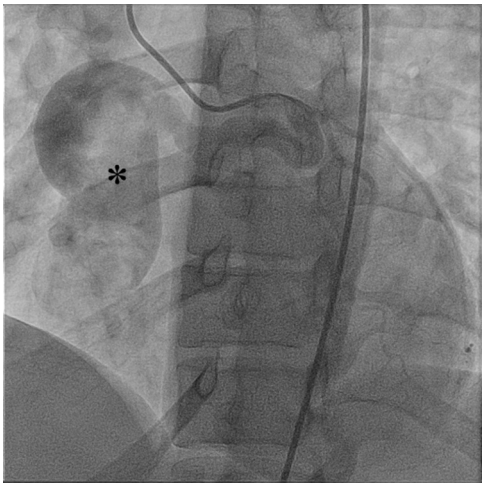

Figure 1. Coronary Angiogram Showing a Coronary–Cameral Fistula

The coronary angiogram (left anterior oblique 28°, cranial 9°) shows a coronary–cameral fistula from the left main emptying via a vascular, kidney-shaped, cistern **(asterisk)** into the right atrium (Online Video 1).

Angiography demonstrated complete cessation of fistula flow (Fig. 5, Online Video 3) and improved angiographic filling of the LAD and LCX coronary arteries. The patient did well, was discharged the following morning, and was well at the 30-day post-operative re-evaluation.

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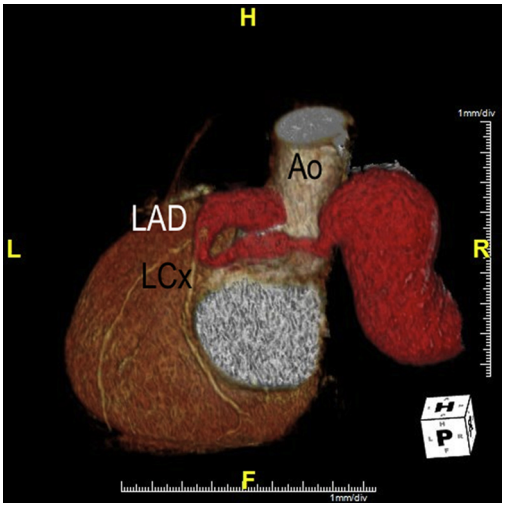

Figure 2. CTA With 3D Reconstruction

Computed tomographic angiography (CTA) with 3-dimensional (3D) reconstruction shows the course of the fistula (shaded in **red**) from the dilated left main coronary, coursing posterior to the aortic root (Ao), then entering the right atrium. Note the position of the origins of the left anterior descending (LAD) and circumflex (LCX) coronary arteries. F = feet; H = head; L = left; P = posterior; R = right (Online Video 2).

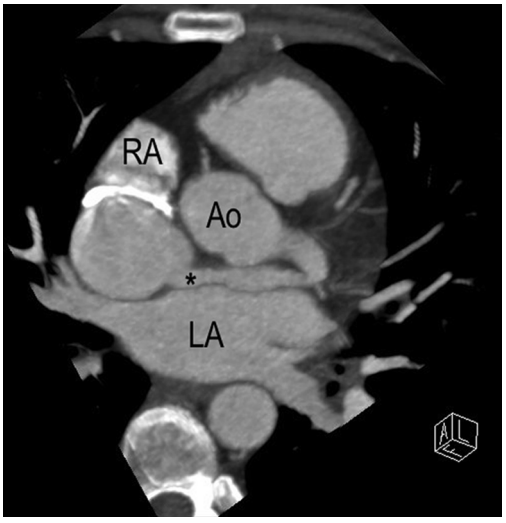

Figure 4. Axial Oblique CTA Image

The CTA image was used to measure the coronary fistula diameter with centerline analysis, thus affording vascular device size selection. The **asterisk** indicates the coronary fistula. LA = left atrium; RA = right atrium; other abbreviations as in Figure 2.

Large coronary fistulae are uncommon, observed in 225 of 126,595 consecutive angiograms (1). The associated shunt may lead to volume loading, arrhythmias, pulmonary hypertension, heart failure, and/or coronary steal.

Treatment options include open surgical and catheterization-based fistula closure. The latter is associated with good procedural success in selected cases (2). Attention to anatomic detail, procedural planning, and the ability to

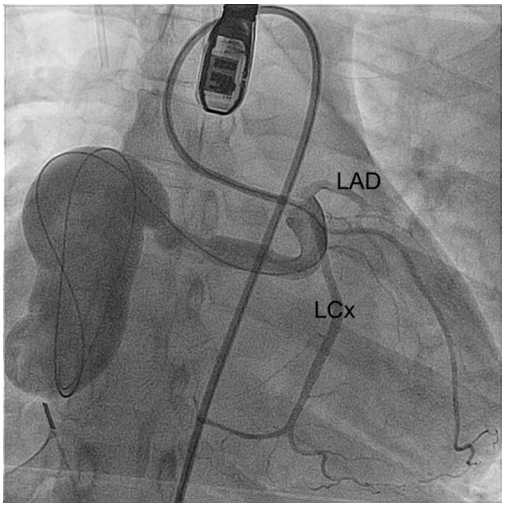

Figure 3. Left Coronary Angiography Using the Shortened 8-F Guide Catheter

Left coronary angiography used the shortened 8-F guide catheter (left anterior oblique 5°, caudal 19°). Note the course of the Terumo Glidewire with the distal segment coiled in the dilated segment of the coronary fistula. Abbreviations as in Figure 2.

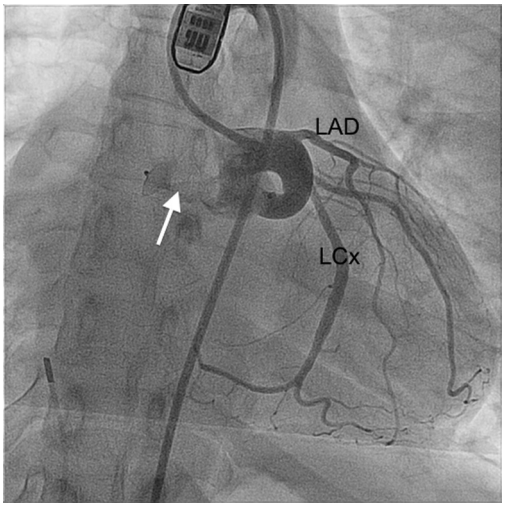

Figure 5. Left Coronary Angiography After Deployment of the AVPII

Left coronary angiography (left anterior oblique 5°, caudal 19°) after deployment of the 12-mm diameter Amplatzer vascular occlusion plug II (AVPII) is shown. Note the absence of flow beyond the AVPII **(arrow)** and improved angiographic filling of the LAD and LCX coronary arteries. Abbreviations as in Figure 2 (Online Video 3).

improvise from standard catheter techniques are important to catheterization-based success. For anterograde closure in particular, it is critical that the operator ensure that fistula closure is distal to the origin of all native coronary branches.

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